REMARKS

Claims 1, 3-7 and 9-20, as amended, appear in this application for the Examiner's review and consideration. Claims 2 and 8 have been cancelled without prejudice.

Claims 1 and 20 were amended to incorporate the features of claim 2, namely that the process includes the additional steps of forming a structure by bonding a donor substrate to the support substrate; and then transferring at least the surface layer from the donor substrate to the support substrate by a layer transfer technique to form the multilayer structure. Of course, these steps are conducted prior to the chemical treatment of the surface layer. The dependency of claims 3-5 was changed due to the cancellation of claim 2, while the dependency of claims 9 and 12 was changed due to the cancellation of claim 8. Also, claims 15-17 were amended for clarity and for consistency with amended claim 1. These claims are further supported by paragraphs 30 and 47 of the published application. As no new matter has been introduced by any of these changes, they should be entered at this time.

Claims 1-20 were rejected as being anticipated by US patent 6,902,987 to Tong et al. ("Tong") for the reasons set forth on pages 2-6 of the office action.

Before addressing the current rejections, a brief description of the presently claimed invention may prove helpful. The current claims define a method for preparing a multilayer semiconductor structure that has a protective layer between an intermediate insulating layer and a surface layer. This protective layer protects the insulating layer from the subsequent chemical treatments to which the structure is exposed after the structure is formed. As noted above, the structure is formed by bonding a donor substrate to the support substrate; and then transferring at least the surface layer from the donor substrate to the support substrate by a layer transfer technique to form the multilayer structure. Then, the surface layer of that structure can be chemically treated, e.g., with hydrofluoric acid, without attacking the insulating layer due to the presence of the protecting layer.

In contrast, Tong discloses a method for bonding surfaces at low temperature. The preparation of the surfaces (see Figs. 1 and 2) consists of

- the formation of bonding layers (col. 5 lines 6-15)
- a potential etching to improve planarity and roughness (col. 5 lines 31-40)
- a polishing of the bonding layer surfaces (col. 5 lines 16-30)

- a further etching step to activate the bonding layer surfaces (by VSE : Very Slight Etch, Plasma, RIE ...) (col. 5 line 41 to col. 6 line19) and a post VSE process by immersing the wafers in a chemical solution to terminate the surfaces (col. 6 lines 30-57), and then,
- the bonding of the surfaces at room temperature (col. 6 line 59 to col. 8 line 22).

Tong thus discloses a method for bonding two wafer surfaces at room temperature wherein different chemical treatments are used during the preparation of the wafer surfaces. Fig. 3C is referenced in office action (point 1), but this does not disclose the present invention. In particular, Fig. 3 shows a structure having:

- a bonding layer 32 having a free face, and
- a layer 31.

If one considers the structure disclosed by Tong in Fig. 3C, in combination with the disclosure at col. 5 lines 35- 40, a silicon nitride layer can be inserted inside the bonding layer 32. This means that a silicon nitride layer will divide the bonding layer 32 in two parts:

1) the upper bonding layer 32 which has a free face and could be considered to be the equivalent of the surface layer of the present invention.

2) the lower portion of the bonding layer 32 which could be assimilated to the intermediate layer 2 of the present invention.

According to this interpretation, which appears to be the one adopted by the Examiner, a number of significant differences are seen for applicants' invention, namely:

- the nature of the surface layer : in Tong, the surface layer is a bonding layer of an insulating material (SiO_2 or silicon nitride: col. 5 lines 6-15), while in the present invention, the surface layer is a thin layer [0030] made of semiconductor material [0032].
- the composition of the surface and intermediate layers are different: in Tong, the surface layer and the intermediate layer have the same composition, (see Fig. 3C) while in the present invention, the surface layer material is a semiconductor material [0027], [0032] and the intermediate buried layer is an insulating layer [0032].

Consequently, as the surface layer 32 of Tong has the same composition as the intermediate layer, it certainly will be etched by a chemical solution that etches the surface layer. Thus, no benefit is gained in Tong's structure by providing such a surface layer. Certainly, the surface layer is not made from a material chosen to be sufficiently resistant to the chemical treatment to protect the intermediate layer from chemical attack, as recited in current claims 1 and 20. Thus, Tong does not disclose or inherently result in the presently claimed invention.

Furthermore, in col. 5 lines 31-40, Tong discloses that the etching and polishing are realized directly on the bonding layer 32 to improve the roughness of that surface. The use of a silicon nitride layer as a protective layer is suggested to limit the attack of the SiO_2 bonding layer 32 by the HF that is applied during the smoothing step.

In contrast, in the present invention, the semiconductor surface layer is not eliminated with the chemical treatment used to attack the intermediate insulating layer [0026], [0033], since this chemical attack is performed after manufacturing of the full structure (surface layer, intermediate layer, protection layer) and the protective layer prevents further attack beyond the surface layer.

Therefore, the silicon nitride layer disclosed in the Tong is used to prepare the bonding layer before bonding the wafers to form the final structure, rather than to protect subjacent layers in the final structure as in the present invention.. In the present invention, this protective layer prevents attack of the buried insulating layer by the chemical treatments occurring after the fabrication of the final substrate, and of course after the bonding step (Figs. 5 to 9 and [0010] of the published application). And nowhere in Tong is it suggested or disclosed that a chemical treatment realized after the bonding step, on the surface layer of the bonded structure, could lead to defects in the intermediate layer that could be prevented by the provision of a protective layer.

For all these reason, it is respectfully submitted that these differences support the novelty and unobviousness of the present claims, in particular because the disclosed chemical treatment in Tong is performed before bonding. In view of the preceding, all rejections based upon Tong have been overcome so that all remaining claims are now condition for allowance

Respectfully submitted,

9-13-05

Date

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